

# The posterolateral approach for fluoroscopy-guided tibiotalar joint injection

Vanja Varenika<sup>1</sup> · Jacob Harter<sup>1</sup> · Edwin Chu<sup>1</sup> · Lynne Steinbach<sup>1</sup>

Received: 9 March 2017 / Accepted: 30 March 2017 / Published online: 12 April 2017  
© ISS 2017

## Abstract

**Objective** To report a novel technique for tibiotalar joint injection that utilizes a posterolateral approach, including indications and technical considerations.

**Methods** The posterolateral approach for tibiotalar injection is similar to that used in posterior subtalar joint injections. Using this technique, the tibiotalar joint space is accessed by directing the needle anterosuperiorly beneath the fibula until the posterior aspect of the talar dome has been reached. A retrospective review was conducted of all posterolateral approach tibiotalar joint injections at our institution.

**Results** Eight patients underwent 12 technically successful therapeutic anesthetic/steroid tibiotalar joint injections using the posterolateral approach under fluoroscopic guidance. All eight patients had anterior predominant arthrosis with large osteophytes and tibiotalar joint space narrowing. The injections were well tolerated without evidence of complications.

**Conclusion** Posterolateral tibiotalar joint injection offers an alternative to the more commonly used anterior approach, particularly in cases of severe anterior predominant arthrosis. An additional advantage of this technique is that the ankle stays in the same position between the initial planning of the needle trajectory and the visualization of contrast flowing into the joint.

**Keywords** Tibiotalar joint · Ankle · Injection · Posterolateral approach · Arthrography · Technique

✉ Vanja Varenika  
vanja.varenika@ucsf.edu

<sup>1</sup> Department of Radiology and Biomedical Imaging, University of California, San Francisco, 505 Parnassus Avenue, San Francisco, CA 94143, USA

## Introduction

Injection of the tibiotalar joint is necessary for both diagnostic and therapeutic purposes. Diagnostic ankle MR arthrography remains instrumental in the assessment of cartilage, osteochondral lesions, intra-articular bodies, and impingement syndromes [1–3]. Therapeutic injection of anesthetic/corticosteroid is a critical component in the management of tibiotalar joint pain and inflammation [4].

Traditionally, tibiotalar joint injections are carried out under fluoroscopic guidance using an anteromedial approach [5]. The foot is plantar flexed, and a needle is introduced between the extensor hallucis longus and anterior tibialis tendons with the anteromedial talar dome serving as the target in the frontal plane (Fig. 1). Care must be taken to avoid the dorsalis pedis artery as well as the anterior lip of the tibial plafond. While this approach works well for routine injections, it presents challenges in the setting of severe arthrosis: the anterior joint space narrowing decreases the size of the target and large osteophytes block the approach into the joint capsule (Fig. 1).

An alternative lateral mortise approach for tibiotalar joint injection has also been described [6, 7]. Using this technique, the ankle is positioned in the mortise view and the upper aspect of the talofibular articulation is targeted. This approach has been utilized in cases of anterior tibiotalar degenerative changes as the talofibular articulation is infrequently narrowed [8].

In this technical report, we describe a novel posterolateral approach for tibiotalar joint injection. As with the lateral mortise approach, this technique can be utilized to avoid the difficulties that arise from accessing the tibiotalar joint in cases of severe anterior predominant tibiotalar degenerative changes. Unlike the anterior approach, the ankle does not have to be repositioned during the course of the procedure.

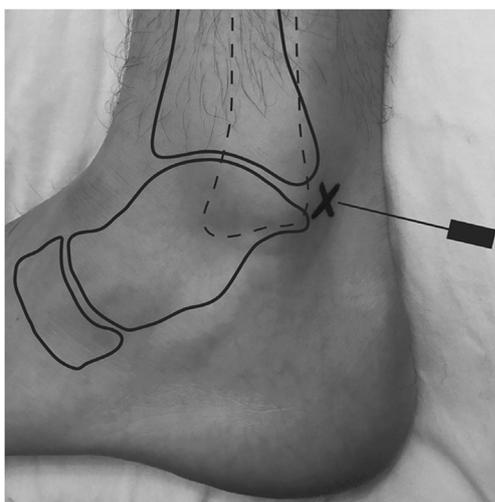
**Fig. 1 a** A 29-year-old female, lateral projection fluoroscopic image demonstrating successful tibiotalar joint injection utilizing the conventional anterior approach. **b** A 54-year-old male, advanced tibiotalar joint arthrosis with severe anterior joint space narrowing and osteophytosis that would make the conventional anterior approach for tibiotalar joint injection difficult



## Materials and methods

Using the posterolateral technique, the patient is placed in the decubitus position with the targeted ankle joint supported underneath by a pillow. The posterior margin of the distal fibula is palpated and marked (Fig. 2). A lateral fluoroscopy projection is then used to mark approximately 1 cm below the posterior margin of the tibiotalar joint. After administration of a skin wheel with local anesthetic, a 1.5-inch, 25-gauge needle is directed anterosuperiorly beneath the fibula and advanced until the posterior aspect of the talar dome has been reached. A small volume of iodinated contrast may then be administered to confirm the intra-articular position of the needle prior to the therapeutic or arthrographic injection (Fig. 3).

After obtaining Institutional Review Board approval, we conducted a retrospective search of all posterolateral approach



**Fig. 2** Schematic of the posterolateral approach tibiotalar joint injection. The ankle is positioned with the lateral aspect of the ankle facing upward. The posterior margin of the distal fibula is marked with an “X.” A needle is advanced anterosuperiorly beneath the fibula toward the talar dome

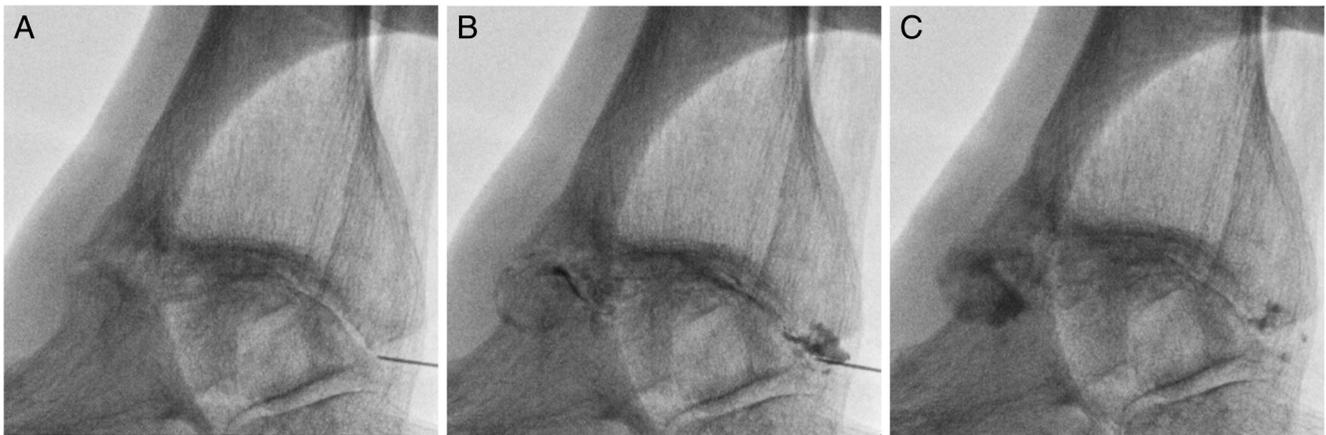
tibiotalar injections performed at our institution. Success of the procedures, as assessed by the presence of intra-articular contrast and patient reported decrease in pain, was evaluated in each case. Patient demographics, indications for utilizing the posterolateral approach, and complications were also recorded.

## Results

We found that eight patients at our institution underwent 12 therapeutic anesthetic/steroid tibiotalar joint injections using the posterolateral approach under fluoroscopic guidance between May 2016 and December 2016 (Table 1). All eight patients had anterior arthrosis with large osteophytes and tibiotalar joint space narrowing, with at least one patient having previously undergone a suboptimal anterior approach tibiotalar injection. Injections were performed by four musculoskeletal radiologists during this period. All 12 posterolateral approach injections were technically successful as confirmed by the presence of intra-articular contrast on fluoroscopy. In addition, the patients reported immediate pain relief following all but one of the injections. The one injection without pain relief confirmed that the pain was from a source outside of the tibiotalar joint. One patient who had previously been injected by the anterior approach reported improved comfort with the posterolateral injection. All injections were well tolerated without evidence of complications.

## Discussion

We have demonstrated that the posterolateral approach can be used to access the tibiotalar joint for both therapeutic injections and ankle arthrography. As with other joints in the body, familiarity with multiple approaches for injecting the tibiotalar joint is an important skill as it affords the radiologist the ability



**Fig. 3** A 73-year-old female, three lateral projection fluoroscopic images of the tibiotalar joint demonstrating a successful posterolateral approach injection. **a** Needle trajectory. **b** Intra-articular contrast injection. **c** Distribution of contrast within the tibiotalar joint

to troubleshoot cases in which there is an obstruction along the conventional trajectory. Additional benefits of the posterolateral approach include the absence of any major arteries in the vicinity of the needle trajectory and not having to reposition either the patient or the x-ray tube to mark the approach and visualize the injection under fluoroscopy. This last advantage may influence the preference of the posterolateral approach over the anterior approach, even in the absence of anterior tibiotalar osteophytes and arthrosis.

As with the other tibiotalar joint approaches, injection of the tibiotalar joint may be challenging for less skilled operators because of the obliquity of the approach. For example, unlike hip and shoulder injections, it is not possible to take a vertical approach into the joint without the use of a C-arm.

No complications arose during the 12 posterolateral approach tibiotalar joint injections that were performed at our institution. Similar to the posterior triceps elbow injection and dorsal radiocarpal injections, this technique has the potential for tendon injury given the proximity of the peroneal tendons to the needle trajectory. During our injections, we consciously avoided traversing the tendons by palpation, and no contrast was seen to fill those tendon sheaths.

In addition, the sural nerve is located in this region. While this is a sensory nerve and therefore does not present a risk for motor deficits, there is a theoretical risk of developing

paresthesia and numbness along the posterolateral aspect of the foot. None of our patients developed a sural neuropathy.

In conclusion, the posterolateral approach tibiotalar joint injection offers an alternative to the more commonly used anterior approach, particularly in cases of severe anterior predominant arthrosis. It also does not require repositioning of the ankle after initial planning of the needle trajectory to visualize the flow of contrast into the joint.

#### Compliance with ethical standards

**Conflict of interest** The authors declare that they have no conflict of interest concerning the materials or methods used in this study or the finding specified in this paper.

#### References

- Chandnani VP, Harper MT, Ficke JR, Gagliardi JA, Rolling L, Christensen KP, et al. Chronic ankle instability: evaluation with MR arthrography, MR imaging, and stress radiography. *Radiology*. 1994;192(1):189–94.
- Helgason JW, Chandnani VP. Magnetic resonance imaging arthrography of the ankle. *Top Magn Reson Imaging*. 1998;9(5):286–94.
- Steinbach LS, Palmer WE, Schweitzer ME. Special focus session. *MR Arthrography Radiographics*. 2002;22(5):1223–46.
- Masala S, Fiori R, Bartolucci DA, Mammucari M, Angelopoulos G, Massari F, et al. Diagnostic and therapeutic joint injections. *Semin Intervent Radiol*. 2010;27(2):160–71.
- Rastogi AK, Davis KW, Ross A, Rosas HG. Fundamentals of joint injection. *AJR Am J Roentgenol*. 2016;207(3):484–94.
- Fox MG, Wright PR, Alford B, Patrie JT, Anderson MW. Lateral mortise approach for therapeutic ankle injection: an alternative to the anteromedial approach. *AJR Am J Roentgenol*. 2013;200(5):1096–100.
- Wright PR, Fox MG, Alford B, Patrie JT, Anderson MW. An alternative injection technique for performing MR ankle arthrography: the lateral mortise approach. *Skelet Radiol*. 2014;43(1):27–33.
- Moon JS, Shim JC, Suh JS, Lee WC. Radiographic predictability of cartilage damage in medial ankle osteoarthritis. *Clin Orthop Relat Res*. 2010;468(8):2188–97.

**Table 1** Our experience with posterolateral tibiotalar injections

Posterior tibiotalar injections	12
Male patients	4
Female patients	4
Patient age range (years)	51–77
Technically successful injections	12/12
Pain relief following injection	11/12
Complications	0